Space Weather Forecast

Issued on Sunday, 03 December 2023 at 13:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of further Moderate-Class flares (R1-R2 Blackouts). G1-G2 (Minor-Moderate geomagnetic storms) likely day 2 and 3 (04 and 05 Dec).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is at Low levels with the largest flare of the past 24 hours a C4.0 flare at 03/0806 UTC from the southwest limb, likely source region ex-AR3494. There are now ten sunspots on the disc. AR3500 in the southwest remains the largest and most significant region, though continues its slow decay as penumbra within the leading and intermediate portions reduce in size and continue to separate. The remaining regions on the visible disc are all small and simple, or mature and stable.

Despite a number of CME signatures evidenced in coronagraph imagery during the past 24 hours, none are considered Earth-directed.

Solar Wind / Geomagnetic Activity: Solar wind speeds, as observed by DSCOVR at L1 have been slightly elevated. The Interplanetary Magnetic Field (IMF) was initially moderate before gradually falling to weak by 03/0020 UTC. The north-south component of the IMF was largely positive. Resultant Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at Background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Low with a chance for isolated Moderate flares (R1-R2 Blackout), and a very slight chance of an isolated Strong flare (R3 Blackout) on days 1-2 (03-04 Dec). The bulk of the significant flare risk is attributed to the moderately large sunspot region in the southwest.

Solar Winds / Geomagnetic Activity: A coronal mass ejection that left the sun late on 01 Dec has a chance to give a glancing impact at Earth late day 2 (04 Dec) or early day 3 (05 Dec), otherwise no Earth-directed coronal mass ejections feature in the forecast period. Solar winds are continuing to ease following the notable coronal mass ejection arrival on 01 Dec. Speeds should fall from Slightly Elevated to Background levels on day 2 (04 Dec) and remain at similar levels until the next solar wind enhancement from a large coronal hole currently moving into the western hemisphere. Speeds should increase to Elevated or Strong levels with this feature, starting from late day 2 (04 Dec) or early day 3 (05 Dec) and likely persisting into day 4 (06 Dec).

Geomagnetic activity is expected to be Quiet to Unsettled on day 1 (03 Dec) and much of day 2 (04 Dec), then forecast to increase to G1-G2/Minor-Moderate Storm (Kp5-6) levels late day 2 or day 3 (05 Dec). Following peak geomagnetic activity, indices should fall to Active to Unsettled by the end of day 3 (05 Dec), before becoming Quiet to Unsettled on day 4 (06 Dec).

Aurora: Auroral activity is expected to become enhanced day 2 or 3 (04 or 05 Dec), when the onset of faster solar winds is expected to arrive at Earth. From the UK views of aurora may be

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possible from as far south as Northern England and Northern Ireland.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to remain at Background levels with a Slight Chance of exceeding the S1 Minor Radiation Storm threshold should any significant flares or notable filament eruptions take place.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	70	50	5
Strong	G3	No	1	10	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	20	10
Very Active	R3 to R5 X	No	5	5	3	1

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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